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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/675,766	09/30/2003	Bernd Goebel	W&B-INF-1908	6273
24131 7590 01/05/2007 LERNER GREENBERG STEMER LLP P O BOX 2480 HOLLYWOOD, FL 33022-2480			EXAMINER VINH, LAN	
			ART UNIT 1765	PAPER NUMBER

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	01/05/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

8

Office Action Summary

Application No.

10/675,766

Applicant(s)

GOEBEL ET AL.

Examiner

Lan Vinh

Art Unit

1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 October 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1 and 3-11 is/are rejected.
- 7) ☒ Claim(s) 2 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1, 3-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hsieh et al (US 5,885,425) in view of Bronner et al (US 6,562,634)

Hsieh discloses a method for selective material deposition on one side of a recessed feature having a polysilicon core 214 and a collar oxide 217 surrounding the polysilicon core (fig. 11), which comprises the steps of:

providing a silicon substrate having a trench/depression formed therein, the trench capacitor with the polysilicon core and the collar oxide being disposed in the depression (col 12, lines 30-35)

introducing a layer 218/mask layer into the depression (col 12, lines 55-57)

patterning the mask layer with an ion beam being directed obliquely onto the depression at an angle for irradiating the mask layer only in an irradiated substrate region of the depression resulting in a removal of the mask layer in the irradiated subregion, the collar oxide 217 being partially exposed during the irradiating (col 12, lines 55-65; fig. 14)

Art Unit: 1765

back etching exposed areas of the collar oxide 217 along the polysilicon core using the mask layer as an etching mask resulting in a back etched collar oxide (col 12, lines 60-65; fig. 15-16)

forming a conductive metallized layer/strap 219 in a region of the back etched collar oxide to contact the polysilicon core 214 of the trench capacitor (col 13, lines 1-5; fig. 18)

Hsieh differs from the claimed invention as per claim 1 by forming a metallized buried strap instead of a polysilicon strap to contact the polysilicon core

Bronner, in a method of forming a memory cell, discloses that a strap conductor can be formed of metal or doped polysilicon (col 4, lines 25-30)

One skilled in the art at the time the invention was made would have found it obvious to modify Hsieh method by forming a polysilicon strap in view of Bronner teaching because Bronner discloses that a strap conductor preferably formed of either metal or doped polysilicon (col 4, lines 27-29)

Regarding claim 3, fig. 14 of Hsieh shows a mask layer comprises of a top liner layer 218 and bottom layer 217, the ion beam patterning the top layer 218

Regarding claim 4, Hsieh discloses forming the collar oxide to cover sidewalls of the depression and the ion beam patterns the mask layer such that the mask layer down to a level above a top of the polysilicon which corresponds to a width of the collar oxide (fig. 15)

Regarding claim 6, Hsieh discloses performing a RIE on the mask layer (col 12, lines 55-60)

Art Unit: 1765

Unlike the instant claimed invention as per claim 5, Hsieh fails to disclose a step of depositing a SiN layer having a thickness of approximately 5-10 nm into the depression. Bronner also discloses a step of forming a SiN layer having a thickness of 0.01 microns (10 nm) into a depression (col 4, lines 35-40).

One skilled in the art at the time the invention was made would have found it obvious to modify Hsieh method by forming a SiN layer having a thickness of approximately 5-10 nm into the depression in view of Bronner because Bronner discloses that the SiN layer can be employed as a hard mask for the strap conductor (col 4, lines 30-35).

3. Claims 7-9, 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hsieh et al (US 5,885,425) in view of Athavale et al (US 6,562,634).

Hsieh discloses a method for selective material deposition on one side of a recessed feature having a polysilicon core 214 and a collar oxide 217 surrounding the polysilicon core (fig. 11), which comprises the steps of:

providing a silicon substrate having a depression formed therein, the trench capacitor with the polysilicon core and the collar oxide being disposed in the depression (col 12, lines 30-35)

etching back the collar oxide along the polysilicon core (col 12, lines 60-65; fig. 15-16)

forming a polysilicon layer 213 on a bottom of the depression (col 12, lines 20-25)

introducing a layer 218/mask layer into the depression (col 12, lines 55-57)

Art Unit: 1765

patterning the mask layer with an ion beam being directed obliquely onto the depression at an angle for irradiating the mask layer only in an irradiated substrate region of the depression resulting in a removal of the mask layer in the irradiated subregion, the polysilicon layer being partially exposed during the irradiating resulting in an exposed polysilicon layer (col 12, lines 41-60 ; fig. 15)

back etching exposed polysilicon 213 down to the collar oxide using the mask layer as an etching mask to define the buried strap contact for the polysilicon core of the trench capacitor in a region of a remaining polysilicon layer (col 12, lines 56-67; fig. 16)

Unlike the instant claimed invention as per claim 7, Hsieh fails to disclose a step of filling the depression with an oxide layer

Athavale discloses a process for forming a vertical transistor comprises a step of filling a depression with an oxide (col 6, lines 1-2)

Hence, one skilled in the art at the time the invention was made would have found it obvious to modify Hsieh method by adding the step of filling the depression with an oxide layer to form a cap layer to protect the gate conductor as taught by Athavale (col 6, lines 23-28)

Regarding claim 8, Hsieh discloses a step of etching the collar oxide for removing the collar oxide from a top of the polysilicon core (col 12, lines 60-65; fig. 16)

Regarding claim 9, Hsieh discloses forming a plurality of depression having a standard geometry (fig. 6A)

Regarding claim 11, Hsieh discloses performing a RIE on the mask layer (col 12, lines 55-60)

Art Unit: 1765

4. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hsieh et al (US 5,885,425) in view of Athavale et al (US 6,562,634) and further in view of Bronner et al (US 6,562,634)

Hsieh as modified by Athavale has been described above. Unlike the instant claimed invention as per claim 10, Hsieh and Athavale fail to disclose a step of depositing a SiN layer having a thickness of approximately 5-10 nm into the depression

Bronner also discloses a step of forming a SiN layer having a thickness of 0.01 microns (10 nm) into a depression (col 4, lines 35-40)

One skilled in the art at the time the invention was made would have found it obvious to modify Hsieh and Athavale method by forming a SiN layer having a thickness of approximately 5-10 nm into the depression in view of Bronner because Bronner discloses that the SiN layer can be employed as a hard mask for the strap conductor (col 4, lines 30-35)

Allowable Subject Matter

5. Claim 2 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

6. Applicant's arguments filed 10/24/2006 have been fully considered but they are not persuasive.

The applicants argue that Hsieh discloses a shadowing of the depression for depositing a mask in part of the depression in contrary to the invention of the instant application as claimed, in which shadowing of the depression is used for irradiating the mask layer only in a part of a subregion of the depression and the present invention as claimed does not require the use of a further mask for structuring the mask layer. This argument is unpersuasive because as shown in fig. 14 of Hsieh, the mask layer 218 is irradiated only in an irradiated substrate region of the depression which reads on irradiating the mask layer only in a part of a subregion. In addition, the term "comprising"/open claim language in claim 1 does not exclude the use of a further mask for structuring the mask layer

The applicants also argue that the present invention distinguishes from Hsieh because it provides the advantage that mask layer is uniformly deposited in the depression. This argument is unpersuasive because it is not in commensurate with the scope of claim 1 since claim 1 does not require "the mask layer is uniformly deposited in the depression

It is argued that Hsieh does not disclose patterning a mask layer with an ion beam that is directed obliquely on to the depression because the Hsieh reference discloses that a mask of the recessed feature is deposited in a portion of the recessed feature by angle collimated sputtering. This argument is unpersuasive because fig. 14 of Hsieh shows a patterned mask layer 218 exposed to an ion beam that is directed obliquely on to the depression which reads on patterning a mask layer with an ion beam that is directed obliquely on to the depression as recited in claim 1

Art Unit: 1765

7. THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lan Vinh whose telephone number is 571 272 1471. The examiner can normally be reached on M-F 8:30-5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571 272 1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1765

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

A handwritten signature in black ink, appearing to be 'LV', is written above the typed name.

LV

December 28, 2006

FIG 1A

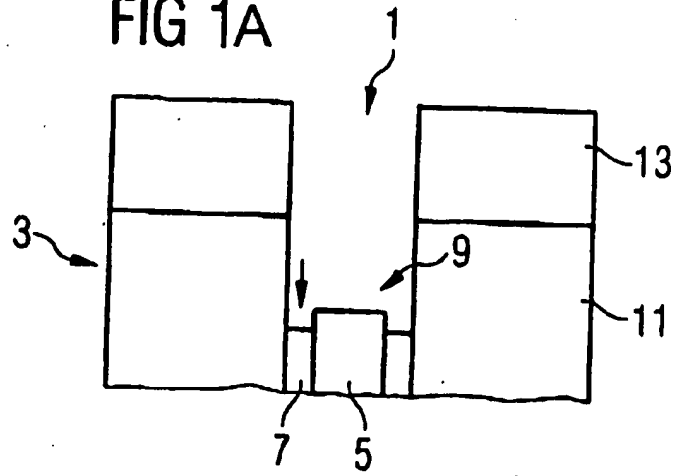


FIG 1B

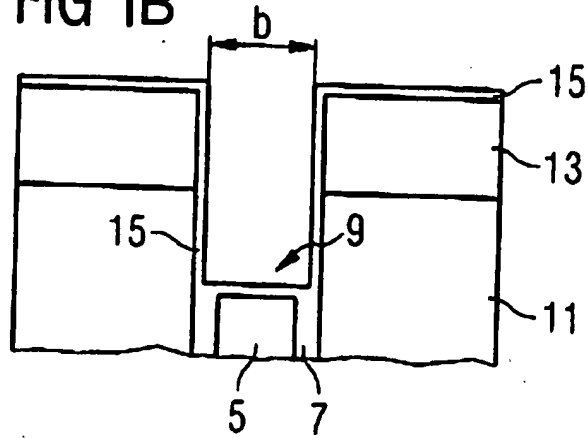


FIG 1C

